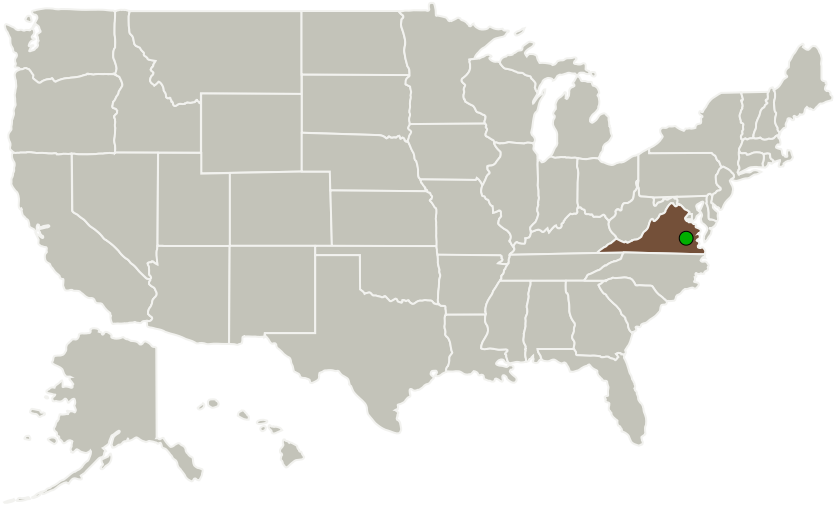
Resin Infusion Fabrication of nanostructured PMC, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

Polymer reinforced composite parts required for heavy lift launch vehicles are currently fabricated by hand lay-up or automated tape lay-up followed by curing using heat, pressure, vacuum and inert atmosphere. Composite structures for future applications are expected to be larger than 9 meters in diameter and greater than 10 meters in length. Such large composite structures cannot be fabricated by regular autoclaving processes because of limitations of the size of autoclaves and high costs associated with energy consumption. In this Phase I effort, MMI will develop a novel out-of-autoclave processing method for the fabrication of nanostructured polymer matrix composites for fabrication of light weight structural parts of large dimensions. This phase of research will also involve a system analysis of the technology to identify the benefits and target areas of use. A correlation study based system analyses will provide a path to apply the fabrication methods to fabricate large composite parts used in aircraft structures. Phase II will scale up the technology and demonstrate property enhancements. The resin infusion process proposed will be suitable for economical manufacture of large parts. The nanocomposite reinforcement proposed will also afford better mechanical properties to the polymer matrix composite.

Primary U.S. Work Locations and Key Partners



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Completed Technology Project (2015 - 2015)

Organizations Performing Work	Role	Type	Location
Materials Modification, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Fairfax, Virginia
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

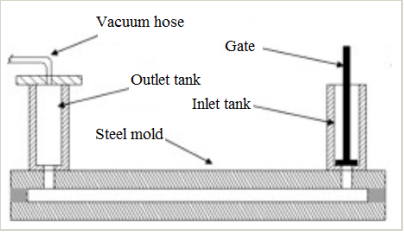
June 2015: Project Start

December 2015: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139400)*

Images



Briefing Chart
Resin Infusion Fabrication of nanostructured PMC Briefing Chart *(https://techport.nasa.gov/image/129397)*

Final Summary Chart Image
Resin Infusion Fabrication of nanostructured PMC, Phase I Project Image *(https://techport.nasa.gov/image/136075)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Materials Modification, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

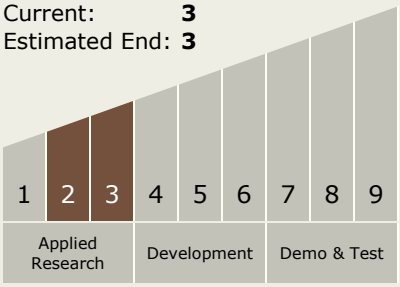
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Tirumalai S Sudarshan

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Resin Infusion Fabrication of nanostructured PMC, Phase I

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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.1 Lightweight Structural Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System